IN THE CLAIMS

1. (currently amended) A computer implemented method for modeling interactions between a plurality of deformable graphical objects represented by models, comprising:

generating a first adaptively sampled distance field having a first spatial hierarchy for a first model representing a first deformable graphical object, and generating a second adaptively sampled distance field having a second spatial hierarchy for a second model representing a second deformable graphical object;

determining a potential overlap region between the first and second deformable graphical objects, during a time step, using the spatial hierarchies of the first and second adaptively sampled distance fields; and

generating, only when the potential overlap region is non-empty, a third adaptively sampled distance field from the first and second adaptively sampled distance fields using a first interaction procedure and first properties, the third adaptively distance field representing a result of the first graphical object interacting with the second deformable graphical object, and generating a fourth adaptively sampled distance field from the first and second adaptively distance fields using a second interaction procedure and second properties, the fourth adaptively distance field representing a result of the second deformable graphical object interacting with the first deformable graphical object, to model the interactions between the first and second ~~models~~ deformable graphical objects.

2. (currently amended) The method of claim 1 wherein the interaction procedures are identity procedures representing an intersection between the first and second deformable graphical objects, and further comprising:

generating an intersection adaptively sampled distance field, the intersection adaptively sampled distance field representing the overlap region between the first and second deformable graphical objects ~~so that the first and third adaptively sampled distance fields are identical, and the second and fourth adaptively sampled distance fields are identical~~.

3. (cancelled)

4. (currently amended) The method of ~~claim 3~~ claim 2 further comprising:

determining interaction forces between the first and second deformable graphic objects from the fifth adaptively sampled distance field.

5. (currently amended) The method of ~~claim 3~~ claim 2 further comprising:

sampling surface cells of the fifth adaptively sampled distance field to determine impact forces at a surface of the fifth adaptively sampled distance field.

6. (currently amended) The method of ~~claim 3~~ claim 2 wherein the fifth adaptively sampled distance field represents a volume of the overlap region between the first and second deformable graphic objects, and further comprising:

sampling the volume of the fifth adaptively sampled field to determine impact forces throughout the volume where the first and second deformable graphic object intersect ~~of the fifth adaptively sampled distance field~~.

7. (currently amended) The method of ~~claim 3~~ claim 6 further comprising:

determining impact forces at a surface of the volume ~~fifth adaptively sampled distance field~~ by analytic means.

8. (currently amended) The method of ~~claim 3~~ claim 6 ~~wherein the fifth adaptively sampled distance field is volumetric, and~~ further comprising:

determining impact forces throughout ~~a~~ the volume ~~of the fifth adaptively sampled distance field~~ by analytic means.

9. (currently amended) The method of ~~claim 3~~ claim 2 further comprising:

determining a force vector F_B acting on the fourth adaptively distance field due to the penetration of the third adaptively distance field by the fourth adaptively distance field by the sum of forces $\mathbf{f}_{Bi} = k_A(\mathbf{x}_i) * dist_A(\mathbf{x}_i) * g_A(\mathbf{x}_i)$, where $k_A(\mathbf{x})$ is a material stiffness of the third adaptively distance field at $\mathbf{x}$, $dist_A(\mathbf{x})$ is a closest distance from $\mathbf{x}$ to the surface of the third adaptively distance field, and $g_A(\mathbf{x})$ is a normalized gradient vector of the third adaptively distance field at $\mathbf{x}$; and

determining a force vector F_A acting on the third adaptively distance field due to the penetration of the fourth adaptively distance field by the third adaptively distance field by the sum of forces $\mathbf{f}_{Ai} = k_B(\mathbf{x}_i) * dist_B(\mathbf{x}_i) * g_B(\mathbf{x}_i)$, where $k_B(\mathbf{x})$ is a material stiffness of the fourth adaptively distance field at $\mathbf{x}$, $dist_B(\mathbf{x})$ is a closest distance from $\mathbf{x}$ to the surface of the fourth adaptively distance field, and $g_B(\mathbf{x})$ is a normalized gradient vector of the fourth adaptively distance field at $\mathbf{x}$.

10. (original) The method of claim 9 wherein k_A and k_B are identical.

11. (original) The method of claim 9 wherein k_A and k_B are different.

12. (original) The method of claim 9 wherein the deformation due to the force vectors F_A and F_B are volume preserving.

13. (currently amended) The method of claim 1 wherein the properties are material properties, and wherein the first interaction procedure is a deformation procedure for modeling a deformation of the first deformable graphic object according to the first material properties, ~~to deform the first adaptively sampled distance field~~ and the second interaction procedure is a deformation procedure for modeling a deformation of the second deformable graphic object according to the second material properties ~~to deform the second adaptively sampled distance field according to first and second material properties of the first and second models respectively~~.

14. (original) The method of claim 13 wherein the deformation procedures combine distance values of the first and second adaptively sampled distance fields at a plurality of locations in the first and second adaptively sampled distance fields.

15. (currently amended) The method of claim 1 further comprising:

offsetting the first and second adaptively sampled distance fields to determine a relative proximity of the first and second deformable graphic objects ~~models~~.

16. (original) The method of claim 1 wherein the time step depends on a frame rate to animate the interactions between the plurality of models.

17. (currently amended) A method for modeling interactions between a plurality of deformable graphic objects ~~models~~, comprising:

generating a first adaptively sampled distance field having a first spatial hierarchy for a first model representing a first deformable graphic object, and generating a second adaptively sampled distance field having a second spatial hierarchy for a second model representing a second deformable graphic object; and

determining a potential overlap region between the first and second graphical objects, during a time step, by comparing distance values stored in the spatial hierarchies of the first and second adaptively sampled distance fields.

18. (currently amended) The method of claim 17 wherein each spatial hierarchy includes surface cells at leaf nodes of each spatial hierarchy, and further comprising:

comparing distance values of the surface cells of the leaf nodes to determine an exact overlap region between the first and second graphical objects.